

Section 1

1. Complete the following:

- a) The first observer of protons: Eugene Goldstein
- b) First scientist to experimentally show the existence of electrons: J. J. Thomsen
- c) This scientist proposed the "nuclear atom" hypothesis: Ernest Rutherford
- d) This scientist discovered neutrons: James Chadwick

2. Distinguish between the mass number and the atomic number for a given element?

Ans. The atomic number is the # of protons in the nucleus of an element. The mass number is the # of nucleons (protons and neutrons) in a certain type of atom (isotope) of an element.

3. Distinguish between the mass number and the atomic mass for a given element?

Ans. The mass number refers to the # of nucleons (protons and neutrons) in a specific atom (isotope) whereas the atomic mass is essentially the "weighted" average mass number for an atom of a given element.

4. Write out the representation for the formation of the following ions:

- a) Na^+ : $\text{Na} \rightarrow \text{Na}^+ + \text{e}^-$
- b) Mg^{2+} : $\text{Mg} \rightarrow \text{Mg}^{2+} + 2\text{e}^-$
- c) Cl^- : $\text{Cl} + \text{e}^- \rightarrow \text{Cl}^-$
- d) SO_4^{2-} : $\text{SO}_4 + 2\text{e}^- \rightarrow \text{SO}_4^{2-}$

5. What are isotopes?

Ans. An isotope is a specific type of atom of an element. It has the same atomic number but different mass number from other isotopes of the same element. Isotopes of the same element have different masses but are chemically identical.

6. In what ways are isotopes of the same element similar & different?

Ans. Isotopes of the same element have the same # of protons, electron organization structure and chemical properties. Isotopes of the same element have different numbers of neutrons and therefore different masses and mass numbers.

7. Write out the representation for the following isotopes:

- a) Hydrogen (mass number = 2): ${}^2\text{H}$
- b) Uranium (mass number = 236): ${}^{236}\text{U}$
- c) Calcium (with 25 neutrons): ${}^{45}\text{Ca}$

Section 2

Using the periodic table as a guide, fill out the following table:

Symbol	Name	Atomic #	Atomic Mass	Mass # (of the most common isotope)	# of Protons	# of Neutrons	# of Electrons
H	Hydrogen	1	1.008	1	1	0	1
He	Helium	2	4.003	4	2	2	2
Li	Lithium	3	6.941	7	3	4	3
Be	Beryllium	4	9.012	9	4	5	4
B	Boron	5	10.81	11	5	6	5
C	Carbon	6	12.01	12	6	6	6
N	Nitrogen	7	14.01	14	7	7	7
O	Oxygen	8	16.00	16	8	8	8
F	Fluorine	9	19.00	19	9	10	9
Ne	Neon	10	20.18	20	10	10	10
Na	Sodium	11	22.99	23	11	12	11
Mg	Magnesium	12	24.31	24	12	12	12
Al	Aluminum	13	26.98	27	13	14	13
Si	Silicon	14	28.09	28	14	14	14
P	Phosphorus	15	30.97	31	15	16	15
S	Sulfur	16	32.06	32	16	16	16
Cl	Chlorine	17	35.45	35	17	18	17
Ar	Argon	18	39.95	40	18	22	18
K	Potassium	19	39.10	39	19	20	19
Ca	Calcium	20	40.08	40	20	20	20
Fe	Iron	26	55.85	56	26	30	26
Ag	Silver	47	107.9	108	47	61	47
Pt	Platinum	78	195.1	195	78	117	78
Au	Gold	79	197.0	197	79	118	79
Hg	Mercury	80	200.6	201	80	121	80
Pb	Lead	82	207.2	207	82	125	82

The Periodic Table of Elements

	1																	18
1	1 H 1.008	2																2 He 4.003
2	3 Li 6.941	4 Be 9.012											5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18
3	11 Na 22.99	12 Mg 24.31											13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95
			3	4	5	6	7	8	9	10	11	12						
4	19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.88	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.70	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80
5	37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3
6	55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)
7	87 Fr (223)	88 Ra 226.0	89 Ac 227.0	104 Rf (261)	105 Db (262)	106 Sg (263)	107 Bh (262)	108 Hs (265)	109 Mt (266)	110 Unn (269)	111 Uuu (272)	112 Uub (277)	113	114 Uuq (289)	115	116 Uuh (289)	117	118 Uuo (293)

Lanthanides	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
Actinides	90 Th 232.0	91 Pa 231	92 U 238.0	93 Np 237.0	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (251)	99 Es (252)	100 Fm (257)	101 Md (258)	102 No (259)	103 Lr (262)